

## ABSTRACT OF THE DISCLOSURE

An object of the present invention is to improve the inter-layer adhesiveness of the diffusion barrier film while  
5 maintaining the lower dielectric constant of the diffusion barrier film. A diffusion barrier film for a copper interconnect comprises an insulating material containing silicon, carbon, hydrogen and nitrogen as constituent elements, and also containing Si-H bond, Si-C bond and methylene bond  
10 (-CH<sub>2</sub>-). The insulating material involves  $I_2/I_1$  of not lower than 0.067 and  $I_3/I_1$  of not higher than 0.0067 appeared in an infrared absorption spectrum; where  $I_1$  is defined as an absorption area of the infrared absorption band having a peak near 810 cm<sup>-1</sup>,  $I_2$  is defined as an absorption area of the infrared  
15 absorption band having a peak near 2,120 cm<sup>-1</sup> and  $I_3$  is defined as an absorption area of the infrared absorption band having a peak near 1,250 cm<sup>-1</sup>.